

*Research Article***The Use of Diode Laser in Dermatology**

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Abstract

Introduction: Diode lasers are solid-state laser devices that have been successfully used over the past several years, because of their reliability and their ability to penetrate into the deeper parts of the skin.

Aim of the work: The aim of the present work is to evaluate the clinical, hisopathological and immunohistochemical skin changes observed after Diode laser hair reduction. **Patients and Methods:** The study was conducted on 20 healthy female volunteers, seeking for hair removal or reduction. They were selected from the Dermatology Outpatient Clinic, at Minia University Hospital in the period of July 2013 to March 2016. **Results:** The present study included 20 female subjects, attending the Dermatology Outpatient Clinic, Minia University Hospital, for hair reduction. The age of these subjects at the time of the examination ranged from 19 to 36 years with a mean \pm SD of 26.2 ± 4.5 years. As regards Fitzpatrick skin type, 3 subjects (15%) were skin type III and 17 subjects (85%) were skin type IV . **Discussion:** Diode lasers are solid-state laser devices that have been successfully used, because of their reliability and their ability to penetrate into the deeper parts of the skin. **Conclusion:** Diode lasers have been used broadly in dermatology because of their realiability and ability to penetrate the deeper parts of the skin and their different wavelengths (800-810, 940 and 1450 nm).

Keywords: DP; Dermal papilla, FDA Food and Drug Administration, FS, fibrous sheath

Introduction

Diode lasers are solid-state laser devices that have been successfully used over the past several years, because of their reliability and their ability to penetrate into the deeper parts of the skin (Gold, 2007).

There are different wavelengths of diode laser used in different dermatological lesions (800nm, 940 nm and 1.450 nm). A solid-state, 800 nm pulsed near-infrared diode laser was studied for permanent hair reduction (Dierickx et al., 1997). Meanwhile, it provides safe and effective treatment for benign pigmented skin lesions (Waldorf et al., 1996).

The pulsed diode laser provides a safe and effective treatment that achieves reduction of unwanted leg vein telangiectasias. Patients with blue or purple leg veins between 0.4 mm and 1 mm in diameter can be effectively treated with an 800 nm diode laser (Bernstein et al., 1998), which also may offer an effective treatment method for leg veins with pain and side effects free. The best results obtained in vessels from 3mm to 4mm in diameter located in the thigh

and with skin phototype III (Trelles et al., 2006).

Diode laser (810 and 940 nm) is safe and may be an effective treatment for facial skin tightening. Maintenance treatment every 2–3 months may be the optimum interval for maintaining the results (Voravutinon et al., 2015). On the other hand, the 1,450 nm diode laser is used in the treatment of facial rhytids (Hardaway et al., 2002).

A variety of laser technologies are now able to successfully remove unwanted hair. Successful removal is based on an understanding of laser physics and appropriate wavelengths, pulse durations and cooling of the skin. Although ruby lasers were among the first to be used, alexandrite, diode and neodymium-doped yttrium aluminum garnet (Nd:YAG) lasers, as well as a variety of broad-spectrum intense pulsed light sources, are more commonly used for the treatment of unwanted hair (Goldberg, 2007). Diode laser is also used to treat other hair related problems like pseudofolliculitis

barbae (Moreno et al., 2002) and acne keloidalis nuchae (Anderson and Parrish, 1983).

Darker skin types are more difficult to treat but can also be treated. Complications can occur after laser hair removal but can be reduced through an understanding of the fundamentals of laser removal. These complications include, the obvious, such as scarring and pigmentary changes, and the not so obvious, such as reticulate erythema. Laser hair removal is now widely accepted as a successful approach to remove unwanted hair in both men and women. The future will involve office-based laser and light source hair removal, beside a variety of laser and light-based home devices (Galvan and Jaen, 2009).

Diode laser is appropriate for treating even the largest areas of the body both quickly and effectively (Lou et al., 2000). An important part of the procedure is the cooling of the skin. A special contact-cooling handpiece allows the physician to treat even the most sensitive skin. It protects and cools the upper layer of the skin before, during and after each laser pulse while directing the laser energy to the hair root (Lou et al., 2000)

The effectiveness of laser hair reduction depends on the patient's skin type. Laser hair reduction is typically more effective in lighter-skinned people (Fitzpatrick skin types I-III) (DiBernardo, 1999). The diode laser is more effective in darker phototypes but the Nd:YAG laser is safer (Thomas, 1999).

Aim of the work

The aim of the present work is to evaluate the clinical, histopathological and immunohisto-

chemical skin changes observed after Diode laser hair reduction.

Patients and Methods

The study was conducted on 20 healthy female volunteers, seeking for hair removal or reduction. They were selected from the Dermatology Outpatient Clinic, at Minia University Hospital in the period of July 2013 to March 2016.

Inclusion criteria

Females aged from 18 to 40 years.

Females with dark black hairs.

All volunteers had never received lasers, light sources or electrolysis for hair removal on treated area before starting the study.

All volunteers had never used topical or any other method for hair removal 2 months before starting the study.

Exclusion criteria

Females with blonde, grey or white hairs.

Pregnant and lactating females.

Patients with inflammatory skin diseases, collagen-vascular disease, androgen producing tumors or immunosuppression.

Female with active bacterial, viral or fungal cutaneous infection within the treatment area.

Individuals with a history of hypertrophic scarring or keloid formation.

Females with signs of hyperandrogenism (severe acne vulgaris, hirsutism and androgenetic alopecia).

Individuals with abnormal hormonal profile to exclude the hyperandrogenic effects on hair growth.

Individuals taking drugs that could induce hypertrichosis as Minoxidil, Phenytoin, Diazoxide and Corticosteroids.

Individuals with past history of oral retinoid use within 6 months prior to hair removal treatment.

Results

Summary of the clinical data of the subjects.

Number of female subjects	20
Age (years)	
Range	19-36
Mean±SD	26.2±4.5
Skin type	
III	3 (15 %)
IV	17 (85 %)

SD; standard deviation

Discussion

Diode lasers are solid-state laser devices that have been successfully used, because of their reliability and their ability to penetrate into the deeper parts of the skin (Ilknur et al., 2010).

Summary

Diode lasers have been used broadly in dermatology because of their reliability and ability to penetrate the deeper parts of the skin and their different wavelengths (800-810, 940 and 1450 nm). 800-810 diode laser is used for permanent hair reduction and also used for treatment of psudofolliculitis and acne keloidalis. It also offers an effective treatment for telagectitic leg veins. The 940 nm diode laser is effective and safe in treatment skin tightening. 1.450 diode laser is used for treatment of facial rhytides.

Unwanted hair is a common aesthetic problem in many cultures. Hirsutism, excess hair growth in androgen-dependent areas, and hypertrichosis greater hair density at any body site, may affect psychologic health by causing depression and anxiety. Hair removal through shaving, waxing, plucking, chemical depilatories, and electrolysis can improve one's quality of life, but many of these techniques provide temporary solutions to unwanted hair. Although electrolysis may permanently remove hair, it is a slow and operator-dependent procedure with variable efficacy.

Lasers and light sources have been used to address this problem with improved success rates in properly selected patients and emerged as the gold standard to remove unwanted hair.

Principle of traditional laser hair removal is based on the use of low repetition rate with the highest fluence as possible to destroy hair follicles without damaging the surrounding tissue.

The different lasers and light sources currently available for photoepilation operate in the red or near-infrared wavelengths and include ruby laser (694 nm), alexandrite laser (755 nm), diode laser (800 – 810 nm), Nd:YAG (neodymium: yttrium aluminum- garnet) laser (1064 nm), and intense pulsed light (IPL) (590 – 1200 nm).

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